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# Ecosystem Services Assessment: A Framework for Himalica



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The International Centre for Integrated Mountain Development, ICIMOD, is a regional knowledge development and learning centre serving the eight regional member countries of the Hindu Kush Himalayas – Afghanistan, Bangladesh, Bhutan, China, India, Myanmar, Nepal, and Pakistan – and based in Kathmandu, Nepal. Globalization and climate change have an increasing influence on the stability of fragile mountain ecosystems and the livelihoods of mountain people. ICIMOD aims to assist mountain people to understand these changes, adapt to them, and make the most of new opportunities, while addressing upstream-downstream issues. We support regional transboundary programmes through partnership with regional partner institutions, facilitate the exchange of experience, and serve as a regional knowledge hub. We strengthen networking among regional and global centres of excellence. Overall, we are working to develop an economically and environmentally sound mountain ecosystem to improve the living standards of mountain populations and to sustain vital ecosystem services for the billions of people living downstream – now, and for the future.



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# Ecosystem services assessment: A framework for Himalica

## Background

Ecosystem services regulate and support natural and human systems through processes such as the cleansing, recycling, and renewal of biological resources, and are crucial for the sustainability of human development in economic, social, cultural and ecological terms (Daily et al. 1997). Human needs have been, and continue to be, satisfied at the expense of altered land use, climate, biogeochemical cycles, etc., raising concerns about the consequences of such changes for ecosystem functioning, the provision of ecosystem services, and human wellbeing (Hooper et al. 2005). Moreover, as the world's population and global economy are growing, the demand for these services and the negative impacts of such demand are likely to increase (Millennium Ecosystem Assessment 2005). As the benefits provided by ecosystem services are neither priced nor marketed, resource users do not take into account the degradation of these services in their resource management decisions (Pant et al. 2012). Such concerns have moved beyond the scientific to the global community with the publication of the Millennium Ecosystem Assessment (Millennium Ecosystem Assessment 2005).

Although the concept of ecosystem services dates back at least to the 1970s, it gained momentum in the scientific literature only in the 1990s and was mainstreamed by the Millennium Ecosystem Assessment in 2005, which distinguished between provisioning, regulating, cultural, and supporting services. The number of publications on the subject has increased exponentially in recent years (Fisher et al. 2009), as well as efforts to put the concept into practice (de Groot et al. 2010). Ecosystems or landscape functions (and services) have become an important concept in policy making, as decision makers have to deal with an explicit demand for landscape services from a broad range of stakeholders. An important feature of the ecosystem service approach arises from the inherent demand for interdisciplinarity that characterize goods and services, in which basic ecological principles have to be taken into account as well as the social and economic aspects that determine environmental management and decision-making processes. However, many issues still remain to be resolved to fully integrate the concept of ecosystem services into everyday landscape planning, management, and decision-making processes due to various limitations in the prevailing approaches (Rasul et al. 2011). In spite of the challenges, there is a growing comprehension of and (economic) competence in ecosystem valuation, as it is crucial to rationalise the importance of ecosystems and landscapes for their sustained ecosystems goods and services (Dasgupta 2010).

The Hindu Kush-Himalayan (HKH) region is endowed with diverse ecosystems and rich biological diversity, which play a critical role in protecting the environment and in providing ecosystem goods and services for much of Asia and beyond (Schild 2008). These ecosystems, like many other ecosystems worldwide, are being degraded by a growing demand for ecosystem goods and services stemming from a burgeoning human population and haphazard infrastructure development, combined with unsustainable use and a poor understanding of the linkages between dynamic ecosystems and their capacity to sustain ecosystem goods and services. The extensive modification of vital ecosystems is affecting natural processes and reducing the capacity of these ecosystems to provide services in the future; however, with the exception of a few empirical studies, there have been no serious efforts to assess the ecosystem services of the HKH region (Rasul et al. 2011).

In keeping with the existing institutional strategy of ICIMOD and the focus of the current Medium Term Action Plan 2013–2017, the Ecosystem thematic area, with support from the Economic Analysis Division, is leading the Ecosystem Services element of the European Union funded project 'Himalica – Support to Rural Livelihoods and Climate Change Adaptation in the Himalayas'. As per the objectives of the programme document, the 'Ecosystem Services' element will focus on: analysing two ecosystems and developing five knowledge products on ecosystem services. To comply with the assigned task, the following framework has been designed for applied research, considering the expected outcome of the project document and the evolving science on the subject.

## Overall goal

The overall goal of this concept note is to assist the Himalica project to achieve the targets for the next five years and execute project activities as envisaged in the project document.

## Specific objectives

The specific objectives of the initiative are to:

- develop a research framework and methodology applicable in the Hindu Kush Himalayas to assess the ecosystem services of potential project areas or landscapes
- identify and assess two ecosystems from the study areas and prepare technical reports and knowledge products
- mainstream ecosystem services knowledge products into partners' planning and development strategies

## Expected outcomes

The two major outcomes expected from the initiative are:

- stakeholders are enabled to plan and mainstream ecosystems services management with sound knowledge products using an ecosystem approach
- the gap in the need for an appropriate and integrated research framework and methodology crises faced by many resources management practitioners in the region is filled

## Activities

To achieve the two major outcomes, the following types of activities will be undertaken:

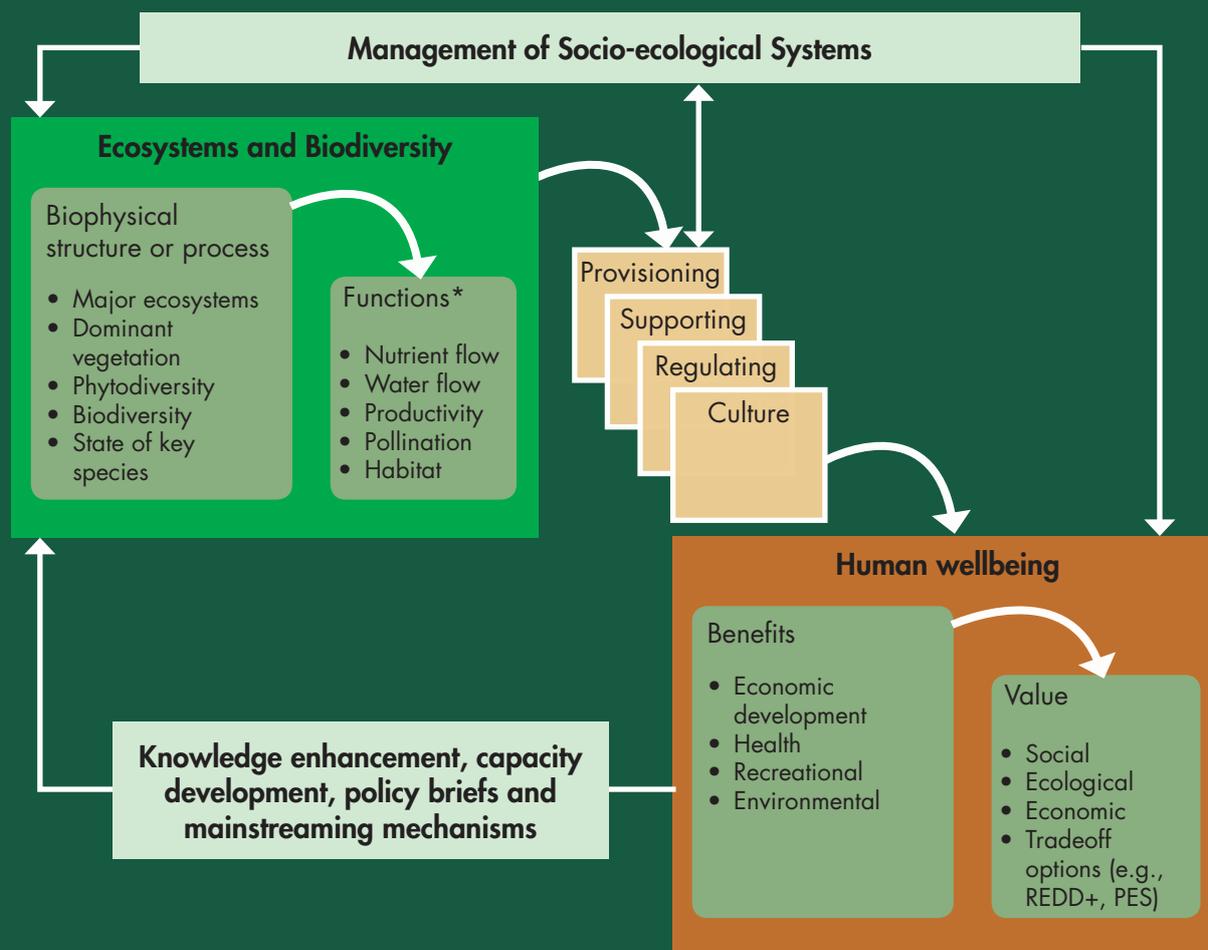
- develop a multidisciplinary team within ICIMOD and develop a research plan
- review the literature on the subject, identify ecosystems for comparison, and design methodologies
- organise capacity building training and workshops and train identified partners on the research design and methodology
- gather data through partners based on letters of agreement and analyse data
- prepare technical reports and knowledge products as per the project documents
- share and follow up to mainstream the knowledge into partners' conservation and development activities

## Research framework

The team assigned to this task will use the 'Ecosystem Services Cascade' Framework (Figure 1A) (de Groot et al. 2010; Müller et al. 2010). This research framework was chosen because it enables the team to rationalise the importance and significance of ecosystem services to human wellbeing. The framework tries to compartmentalise the elements that are necessary for any systematic ecosystems services assessment, but could be readjusted based on the need and requirements of the study area. It allows the prioritization of, and focus on, elements of each of the compartments, namely, ecosystems and biodiversity, ecosystem services, and human wellbeing, and considers the elements of each of the compartments with the logical linkages necessary for developing linkages between the ecosystem services and human wellbeing (Figure 1A). The framework also enables us to understand the state of ecosystem services, dynamics of such services in a given study area, and links with people's dependency to strengthen the decision-making process. The anticipated work from the Ecosystem thematic area would also focus on the information and knowledge flow back (depicted by the shaded line in Figure 1) as part of the impact pathway, which conventional ecosystem assessment practices have not considered as a cyclic or virtual process.

Two main types of indicators are envisaged to be vital in the research design for ecosystems services in the present study: state indicators describing what ecosystem structure, processes, and functions are providing the service and how much (e.g., people's dependency), and performance indicators describing how much of the service can potentially be used in a sustainable way (e.g., resource availability). As the knowledge of ecosystem services is to be linked with human wellbeing, the importance ('value') of ecosystems and their services can be considered within three value domains, namely, ecological, socio-cultural, and economic. The ecological value encompasses the state of health of a system (and not necessarily in economic terms) measured with ecological indicators such as diversity and integrity (and

Figure 1: A research framework for ecosystem assessment linking to impact pathways



Source: Modified from de Groot et al. 2010 and Müller et al. 2010

trend and projection if applicable), while socio-cultural values include the importance of services to the people in terms of their culture and traditions, for example, the cultural identity and practices that are related to the use of ecosystem services (Raymond et al. 2009). Apart from these, the conventional economic valuation methodologies suggested by Rasul et al. (2011) and contemporary tools such as remote sensing, geographic information system, and modelling will also be used to understand the state and dynamics of ecosystems services, analysed in relation to their ecosystems.

To address the indicators for ecosystem structure, process, function, and quantity, a number of set questioned have been adopted from global frameworks (de Groot 2010) and prioritized as per the requirements for this action regional landscape programme and the thematic paper developed for ecosystem services (see Box 1).

## Methodologies and approaches anticipated for the research

The framework is an integrated approach under which multidisciplinary teamwork is inevitable. We firmly believe that the ecosystem services assessment of Himalica has to be integrated with other components and be conducted by a transdisciplinary team. To focus on the ecosystem services, we envisaged using the following broad methodology and approaches:

- Participatory rural appraisal tools: Resource mapping, mobility maps for resource/service use; historical timelines; stakeholder analysis; institutional mapping; seasonal calendar; pair-wise ranking, focus group discussions, and transect walks, etc.

## Box 1: Research questions to better integrate ecosystem services in ecosystem/landscape planning, management and decision-making

Understanding and quantifying the state of ecosystems and their goods and services

- What are the major ecosystems found in the study area and what are their status?
- What are the major ecosystem services provided by these ecosystems?
- What is the state of ecosystem services in the given study area?
- How can these ecosystems and the services provided by them be spatially mapped and show changes?
- What is the effect of (changes in) dynamic conditions (temporal and spatial) of ecosystem change on services?

Valuing ecosystem services

- What are the most important ecosystem services contributing to the economic wellbeing of the communities?
- Are there any species or ecosystems that are socio-culturally valuable?
- What are the ecologically significant species or ecosystems?
- How can values (ecological, social, and economic) be mapped to facilitate the use of ecosystem services in (spatial) landscape planning and design?

Use of ecosystem services in planning and management

- How can learning and outputs from the experimental research be mainstreamed into policy and practices on ecosystem planning, design and management?
- What could be the strategic measures to balance ecosystem management with rural livelihoods improvement so as to sustainably supply ecosystem goods and services through a participatory approach?

- Household survey: A household questionnaire (see Annex 3) has been developed and field-tested considering various aspects and expertise. Expert inputs in terms of economic valuation are anticipated from the Economic Analysis Division at ICIMOD.
- Geospatial tools: Remote sensing and GIS, niche modelling, and habitat suitability will be used on some of the key elements of the ecosystems.

## Institutional framework and partners

This component of the Himalica project will be implemented within the ICIMOD's Strategic Framework and Medium Term Action Plan 2013–2017 by professionals from the Ecosystem Services Thematic Area and Economic Analysis Division, in close collaboration with the Livelihood Regional Programme and project coordinator. The team will work closely with representatives of national stakeholders from ICIMOD's regional member countries for the identified project areas, including conservation and development organizations and community-based organizations. The executing partners will be identified based on the criteria set by the project documents and in consultation with other component leaders for complementarity.

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